FUEL EFFICIENCY

Volvo Trucks. Driving Success.®

PROVEN STRATEGIES TO BOOST YOUR MILEAGE, PERFORMANCE AND SAVINGS.

BETTER FUEL EFFICIENCY STARTS RIGHT HERE.

The benefits of increased fuel efficiency are simple: you save money and reduce CO_2 emissions. But that doesn't mean it's easy. Lowering fuel consumption for your trucks depends on factors that range from engine and transmission performance to cab design, the routes you take and the drivers you hire and train.

Since today's fuel prices account for a large portion of your fleet's total operating costs, Volvo has pioneered strategies to help you log more miles using less fuel. The strategies featured here are proven tools for saving money. Put them to work and you'll make your fleet more profitable, year after year.

SCR VS EGR

Two technologies. But only one way to increase your fleet's fuel efficiency.

The challenge: meeting EPA 2010 requirements.

As the diesel engine industry worked to meet EPA 2010 emissions requirements, two NOx-reduction technologies emerged: SCR, Selective Catalytic Reduction; and MEGR, Massive Exhaust Gas Recirculation. While SCR and EGR seem to be competing technologies, Volvo found a way to use the best of each. Our proprietary SCR aftertreatment uses less EGR and eliminates active regeneration. It improves fuel efficiency, engine performance and driver uptime.

SCR: The preferred technology for EPA 2010 engines.

An MEGR engine uses more recycled exhaust, which reduces the amount of available oxygen and creates more soot. This increases the need for active regeneration—and uses more fuel. On the other hand, the Volvo SCR system reduces the amount of EGR, increasing the amount of oxygen and reducing the need for regeneration, which helps to increase fuel efficiency.

With Volvo SCR, a small amount of Diesel Exhaust Fluid (DEF) —a water solution of urea—is injected into the exhaust. This turns the NOx into nitrogen and water vapor, with no pollution. Most importantly, it allows the engine to be restored to a more normal state of operation for better performance and increased fuel efficiency.

No active regeneration.

For 2010, Volvo went the extra mile to develop the ultimate regeneration technology. By rebalancing the NOx-to-soot ratio, Volvo has increased passive regeneration—which occurs automatically—to a level that eliminates the need for active regeneration under normal highway driving conditions. This not only saves fuel, but reduces driver downtime.

Volvo SCR engines can deliver 5% better fuel efficiency.

Increased fuel efficiency is the primary reason why Volvo Trucks selected SCR for our EPA 2010 engines. In fact, these engines can deliver 5% better fuel efficiency than our highly efficient EPA '07 engines. And for every dollar you invest in DEF, you'll get two dollars back in reduced diesel fuel costs. Even with the cost of DEF taken into account, Volvo truck engines for EPA '10 will reduce your fleet's fuel costs.

VOLVO POWER WITH ECO-TORQUE

Volvo D11, D13 and D16 engines with Eco-Torque feature low rpm and top gear operation to save fuel.

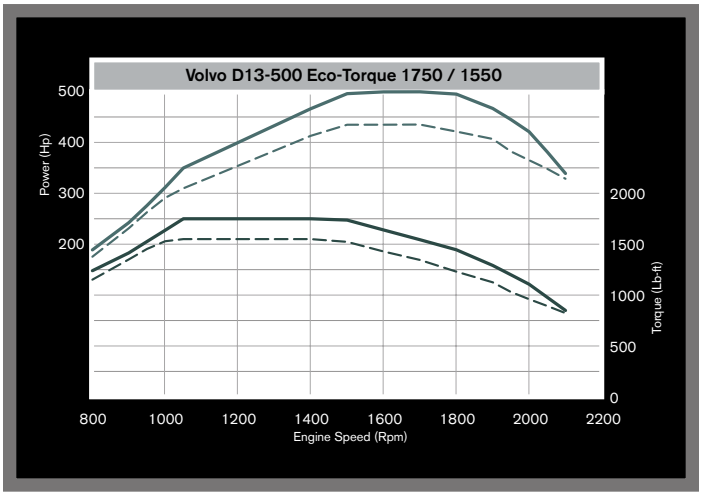
Volvo engines with our innovative Eco-Torque feature deliver torque ratings that maximize their fuel efficiency.

With Eco-Torque, the truck accelerates normally through all bottom gears. In the top two gears, where most fuel is consumed, the engine defaults to a lower torque curve. Higher torque is available on demand, but only under certain conditions.

More power for the hills. More efficiency for your bottom line.

Each Volvo Eco-Torque engine rating has a higher torque curve and a lower torque curve. The nominal horsepower for each rating is associated with the higher torque curve. On a steep grade, performance is enhanced when the engine automatically switches to the higher curve. Engine efficiency under these full-load, low-rpm conditions is at its maximum. The engine will revert to the low curve when the power demand is removed and cruise conditions are resumed.

This saves fuel by encouraging operation at a lower, more efficient rpm, and provides a fleet engine that's capable of cresting most hills in the top gear. Plus, the driver quickly learns that this exceptional Eco-Torque performance is obtained by operating at low engine rpm.



Ratings that save your fleet money now, and pay you back at trade-in.

All Volvo engines may be up-rated to the highest rating within their displacement with only a software flash, limited only by transmission capacity. For example, a fuel-efficiency-conscious fleet owner may specify the tractor with a 405 Eco-Torque engine and Volvo I-Shift transmission. At trade-in, the engine may simply be re-flashed to a full 500 horsepower and 1750 lb-ft torque, for higher residual value. There's no need to replace any driveline or cooling components, and no engine hardware, such as turbo or injectors, needs to be changed.

What kind of fuel efficiency does Eco-Torque deliver? A lot depends on driver, payload, terrain and other factors. But with Eco-Torque, you can expect the best possible fuel efficiency from your fully loaded EPA '10 Volvo truck.

I-SHIFT

Volvo I-Shift transmission keeps your fleet in the sweet spot.

I-Shift: Better for you, your fleet and your bottom line.

Volvo I-Shift is a 12-speed, two-pedal, automated manual transmission (AMT) that maximizes driver comfort, payload capacity and fuel efficiency.

I-Shift is designed to integrate seamlessly with Volvo engines and requires virtually no maintenance. It's ideal for applications such as line haul, heavy haul, construction, distribution, pick-up and delivery. Available in four feature-specific packages, I-Shift can be customized to fit the demanding needs of fleets of all sizes.

A transmission with intelligence.

The I-Shift transmission management system employs a next-generation microprocessor to deliver "intelligent" features that improve driveability and fuel efficiency. For example, I-Shift knows the efficiency map for each Volvo engine. By continuously monitoring the changing grade, vehicle speed, acceleration, torque demand, weight, rolling and air resistance, I-Shift can instantly predict and select the most efficient utilization of the engine. In other words, it knows when and where a shift would be beneficial.

Advantages to reduce your fuel costs.

I-Shift lets every driver shift like a fuel efficiency expert, reducing your fleet's fuel costs. Smooth shifting puts less stress on the driveline and the tires, and can extend the useful life of the driveline and minimize maintenance. I-Shift is also light in weight, increasing your payload opportunity.

Drivers can trust I-Shift to always select the right gear to stay in the engine's "sweet spot." This level of ease reduces fatigue, helps with driver retention and reduces the time it takes for a driver to make a profit on the road.

The best AMT on the road is the best AMT for your fleet.

Volvo I-Shift has the highest torque capacity in the industry. It's almost 200 pounds lighter than the competition, and requires little maintenance. It's the only AMT with features like Eco-Roll® to save fuel, and Kick-Down to maximize acceleration. And only I-Shift is available with enhanced PTO functions.

FUELWATCH

Fuelwatch is designed to help fleet managers get maximum fuel efficiency from every gallon.

Lowering fuel consumption depends on hundreds of factors that range from the truck to the route to the skill of the driver. That's why Volvo created Fuelwatch: a comprehensive approach that results in considerably lower fuel costs for Volvo truck owners. Fuelwatch tells you where the immediate and long-term savings are, and how to capture them. It's the best way to protect your fleet's bottom line as you help protect the environment.

Fuelwatch takes a close look at every area of truck selection, maintenance and operation and saves you money in each one:

VEHICLE OPTIMIZATION

- Correct Specifications
- Fuel Savings Maintenance
- Efficiency Upgrades

OPERATING EFFICIENCY

- Monitoring and Measuring Results
- Driver Development

Fuelwatch starts when a vehicle is ordered, ensuring that it's optimally specified for its intended application. Drivers are assisted by technical features such as I-Shift and special training courses. And out on the highway, you'll see the savings every day. Fuelwatch—and improving your fuel efficiency—depends on many factors: information, equipment and specialized training, all designed to put you in control of fuel costs. Working with your Volvo Truck dealer, Fuelwatch can help your fleet be more profitable, mile after mile.

DRIVING TIPS

Driving tips to increase fuel efficiency and lower costs.

Nothing affects your bottom line more than driver performance. Here are proven tips that tell drivers what to do—and what not to do—to save fuel and maximize truck performance when they're out on the road.

What to do:

- Slow down! Above 55 mph, each 1 mph increase reduces fuel efficiency by 0.1 mpg.
- Coast when possible. When approaching the crown of a hill or a red light, release the accelerator. Using the truck's own momentum can save fuel.
- Operate at a constant speed. On smooth, flat stretches, use cruise control to supply a more even amount of fuel.
- Driving technique can impact fuel efficiency up to 5%. The most efficient drivers can get about 30% better fuel efficiency than the least efficient drivers.
- Try to stay in top gear at least 85% of the distance in a normal highway application; let the engine lug down when slowing.
- Make as few shifts as possible (skip shift). This avoids unnecessary high revs that can rob fuel. Shift between 1150 and 1500 rpm.

What not to do:

- Avoid speed changes (speeding up and slowing down). Each 0 to 65 mph acceleration uses up to ½ gallon of fuel.
- Avoid idling whenever possible. Each hour of idle time (in long-haul operation) can decrease fuel efficiency by 1%. Fuel used during idle does not move your freight and reduces overall fuel efficiency. Also, be aware of idling restrictions in many states.

Extra steps you can take:

- Minimize your trailer gap. If possible, move stationary fifth wheels forward, or add some rear stops on sliders. Decrease your trailer gap (especially on box vans) for best fuel savings. Reducing trailer gap 10" can save up to 1% or more. Best gap is approximately 36".
- Evaluate electronic engine settings. Electronic settings are easily changed; settings that match your application can yield the best savings. Use optimum Road Speed Limits.
- Use Gear Down Protection. Your best fuel efficiency is in high gear, not one gear down.

Other factors that affect fuel efficiency:

- At any speed, the driver is the biggest contributor to mpg. After that, tires are the most important factor in mpg below 55 mph; aerodynamics contribute most above 55 mph.
- Above 55 mph, each 2% reduction in aerodynamic drag results in approximately 1% improvement in fuel efficiency.
- Fuel efficiency can increase up to 7% after tires are broken in (35,000–50,000 miles).
- Used lug drive tires can get up to 0.4 mpg better fuel efficiency than new lug tires.
- Ribbed tires on drive axles can get 2-4% better fuel efficiency than lug tires.
- Each 10 psi that a truck tire is underinflated can reduce fuel efficiency by 1%.

DRIVER DEVELOPMENT

Cut your fuel costs with effective driver training.

The driver is the key to vehicle performance. That's why effective driver training can pay off almost immediately. Tests show drivers who adopt more fuel-efficient driving techniques can reduce fuel costs 5% or greater.

Volvo driver development is designed to teach drivers what to do—and what not to do—in any situation when the engine is running. Here are our top tips for driving, setting the engine and using Volvo's Performance Bonus Guide to train your drivers.

Engine settings:

- Electronic settings available with every Volvo engine can be set to help the driver in specific—and often less obvious—activities. Maximum Road Speed has a dramatic effect on fuel efficiency, and the Volvo Road Speed Limit—set for reasonable road speeds—helps many operators reduce fuel consumption.
- The Eco Road Speed Limit Control allows the truck to slow 2 mph on upgrades before responding to the throttle, for maximum power to maintain road speed. Volvo's Gear Down Vehicle Speed Limiter encourages the driver to operate in top gear for maximum fuel efficiency.

Vehicle operation:

- Allow engine to lug down (shift between 1150 and 1500 rpm).
- Try to stay in top gear at least 85-90% of the time in normal highway driving.
- When approaching the crown of a hill or red light, release the accelerator and use the truck's own momentum to save fuel.

Idle time:

- With an idle time of 10% of total engine hours, you'll see a 1% fuel efficiency loss.

Speed:

- Slow down: an increase of 1 mph equals a loss of 0.1 mpg.

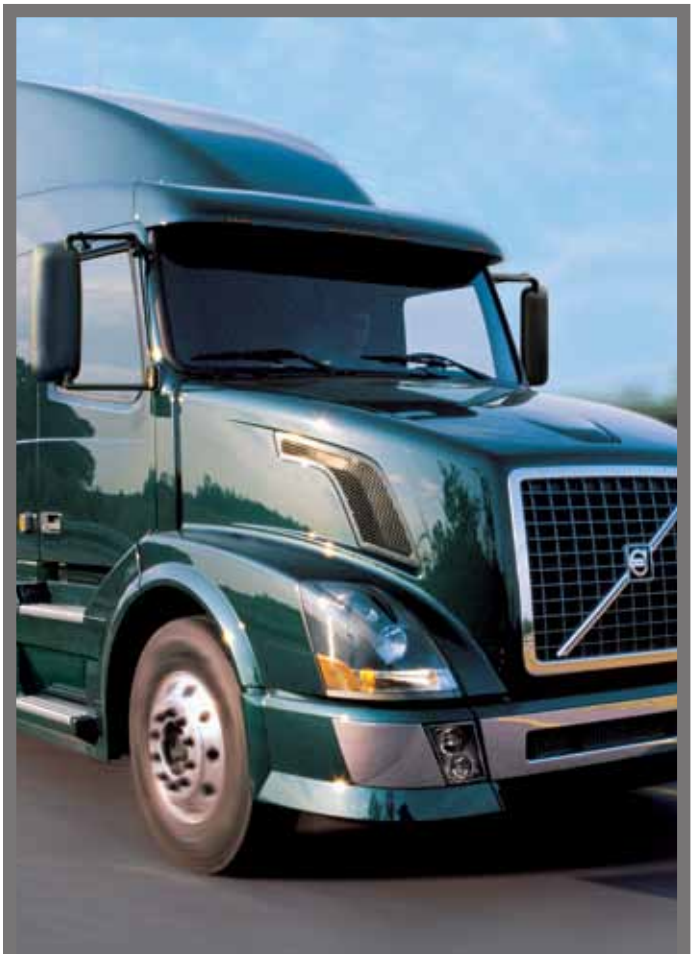
Terrain and routes:

- Steady (average) speed is better than many small up and down speed changes; each acceleration between 0 and 65 mph uses about ½ gallon of fuel or the equivalent of 4-5 minutes of typical highway driving.
- Stop/go/traffic accelerations have a HUGE impact.
- On a smooth, flat stretch of road, utilize cruise control to supply a more even amount of fuel.

Performance Bonus Guide gives drivers immediate fuel efficiency feedback.

Performance Bonus Guide is a unique ride-along "coach" in the Volvo Driver Instrumentation Display that tells the driver how to operate the engine for best fuel efficiency. The Volvo Performance Bonus Guide feature is active over 25 mph, and includes the driver aids pictured on the right.

Ask your Volvo Truck dealer for details on how to get the most out of your fleet for safer, more efficient driving.



PERFORMANCE BONUS GUIDE

RPM	If the driver uses too many revs, the rpm DOWN reminder tells him to upshift to bring it back to the sweet spot.
	There are times when the rpm is in the sweet spot but the driver is using too much throttle. Easing up slightly will bring him into the sweet spot. This function also illuminates in cruise control.
$	As the parameters approach the sweet spot, a single dollar sign illuminates. Half of the fuel burned goes toward meeting the target percentage of fuel burned in the sweet spot.
$$	When all the parameters meet the requirements, the double dollar sign illuminates and all fuel burned goes toward meeting the target. This symbol will even illuminate at full throttle if the rpm is below 1350 rpm, showing that mode is a very efficient way to run the engine.
	When the target is achieved, the trophy illuminates. If Performance Bonus is achieved, the driver can receive certain incentives, which might include an increase to the road speed, enabling of special I-Shift functions, or other recognition or rewards.

INSTRUMENT CLUSTER

All the information you need, all in one place.

Volvo's Intelligent Dash puts just the right amount of information right where it's needed. The layout is neat, clean and free of clutter. Critical gauges are highly visible in the instrument cluster, with little else to distract the driver from safely operating the truck.

Complete system status and fault alerts at your fingertips.

For a normal operating situation, the Volvo Driver Information Display (DID) shows the default information selected by the driver. If a system, gauge or sensor goes out of the normal operating range, the display will automatically note the abnormality. It will also immediately indicate when a fault has occurred by displaying an easy-to-read message.

Volvo's Driver Information Display (DID):

- Provides real-time information to the driver.
- Displays digital gauges and other data for vehicle status and performance, including average fuel efficiency, distance to empty and more.
- Can be set up for personal display preferences, including up to three "favorite" windows for key gauges or data.
- Drivers can scroll through the menu and select options via the control stalk switch to the right of the steering wheel. This also allows the driver to select actions when messages are automatically displayed on the DID.

Indicators for fuel efficiency and performance

All Driver Information Displays feature menu-driven commands to help manage Volvo's SCR aftertreatment system. Base and Premium displays also feature menus for additional features and functions. Drivers can scroll through digital gauges, view fuel data, review trip and distance data, and more.

INSTRUMENT CLUSTER	
1	Tachometer
2	Telltales (including STOP, CHECK and INFORMATION lamps)
3	Speedometer
4	Front brake air pressure
5	Rear brake air pressure
6	Oil pressure
7	DEF level
8	Telltales (including DPF, battery, diff lock, traction control, etc.)
9	Driver Information Display
10	Fuel level
11	Coolant temperature
12	Application air pressure
13	Intake manifold pressure

Performance Bonus Program

The Performance Bonus option is designed to encourage drivers to operate their Volvo truck for optimum efficiency. Efficient operation can be rewarded with an increase to their Road Speed Limit, or drivers can receive other incentives as you see fit.

The Performance Bonus display provides real-time status of vehicle performance, so drivers know exactly when they are being most efficient—for example, when they're in the "sweet spot" and achieving the best fuel efficiency.

SMARTWAY®

Reducing fuel consumption makes sense for your fleet. And for our planet.

Volvo manufactures EPA SmartWay-verified technologies.

Volvo Trucks is proud to partner with the U.S. Environmental Protection Agency to manufacture EPA SmartWay-verified technologies. This type of technology is found on our SmartWay Certified VN Tractors. Volvo has developed a comprehensive package of SmartWay components that deliver high fuel efficiency and low emissions.

Volvo SmartWay tractors are equipped with:

- SCR engines certified to the very strict U.S. EPA '10 emissions standards.
- Aerodynamic enhancements, including integrated high roof fairings, fuel tank side fairings, side fairing gap reducers, plus aerodynamic bumpers and mirrors.
- Anti-idling options.
- Low-rolling resistance tires.

What makes a Volvo VN a certified SmartWay vehicle?

The EPA's SmartWay program has strict requirements that each truck must meet to become a Certified SmartWay truck. Volvo starts with a sophisticated aerodynamic design, honed through extensive computer simulation and wind tunnel testing. Then we add enhancements.

Aero bumper

Volvo's aerodynamic bumper optimizes airflow around and under the vehicle, and has an optional extended drag reduction plate to reduce turbulence behind the bumper for even better airflow.

Chassis fairing

The full-length chassis fairing reduces wind resistance over chassis-mounted components such as fuel tanks.

Aero mirrors

Even a small component can make a difference for wind resistance, so Volvo's mirrors are smoothed and rounded to catch as little air as possible when traveling down the road.

Roof fairing

Moving the air smoothly from over the cab to over the trailer makes a huge difference. Our integrated cab high roof fairings bridge the gap, whether the cab has a flat, mid- or full-height roof. We even offer a patented adjustable fairing extension with a trim tab, so operators can precisely tailor their aerodynamics to their trailer, for up to a 1% increase in fuel efficiency.

Cab side extenders

Cab side extenders reduce the distance between the back of the cab and the front of the trailer, for a major aerodynamic boost. Volvo's extenders and optional extended fairings feature a compound curve that matches the cab curve to the trailer. This allows the truck to pass the air to the trailer with minimum turbulence.

Lower emissions plus greater fuel efficiency. That's smart.

Low emissions are central to SmartWay goals, and Volvo's D11, D13 and D16 SCR engines are certified to the stringent EPA '10 emissions requirements. Volvo SCR engines can deliver 5% better fuel efficiency than our previous generation of engines.

Put these strategies to work, and you'll save money on every truck in your fleet.

Volvo Trucks has a long history of fuel efficiency innovation. And since today's fuel prices account for a large portion of your fleet's total operating costs, we're constantly pioneering new strategies to help you reduce fuel consumption.

By saving fuel, you'll save money. And you'll do it truck after truck, mile after mile. Find out all the ways to maximize your savings and profitability by contacting your Volvo dealer today.

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